

developed in purely pelagic cetaceans like the killer, while in littoral or fluviatile forms, such as the narwhal, the white whale and the Japanese porpoise, it is either small or wanting. It is, further, noticeable that cetaceans with pointed muzzles (of which *Zeuglodon* is one) nearly always have a larger back-fin than those in which the muzzle is short and rounded. In the whalebone bones, among which the dorsal fin is either small or wanting, its function may be discharged by the keel on the middle of the upper jaw, or, owing to corporeal bulk, no such function is required at all.

If, then, we are right in regarding *Zeuglodon* as a pelagic cetacean, it is evident that it could not have been completely armoured, but that such armour as it retained was merely a survival from a fully armoured non-pelagic ancestor. For it is almost impossible to believe that the ancestral cetacean was not invested in a complete panoply, at least on the dorsal region.

The whole argument is tersely summed up as follows by Dr. O. Abel (*Beitr. Pal. Oster.-Ung.*, vol. xiii. pt. 4, 1901), to whom naturalists are indebted for these interesting researches.

In their earliest stage of development the toothed whales were fully armoured. The object of the armour was as a defence against enemies, such as sharks, such an armour being also very valuable to animals exposed to the force of a strong surf on rocky shores. As the creatures took more and more to an aquatic life, the acquisition of greater speed would be of greater value to them, and this would be accomplished by diminishing the specific gravity and friction of the body, the shortening of the extremities and the development of a caudal fin to serve as the sole instrument of locomotion.

Accordingly the armour would very soon be lost by the pelagic cetaceans in order to diminish friction and lighten the specific gravity. Only among certain types, which diverged at an early epoch from the ancestral stock and took to a fluviatile or estuarine life, did vestiges of the armour persist, while the dorsal fin remained undeveloped (*Neophocaena*). That in this form, as well as in the closely allied true porpoises (*Phocaena*), we have the most primitive type of living toothed whales, is confirmed by the nature of their dentition, as well as by the circumstance that in this group alone the premaxilla is toothed. The relation of the interparietal to the parietals is likewise confirmatory of the antiquity of the porpoises.

As many of our readers are aware, *Zeuglodon* differs from modern cetaceans by the characters of its teeth, those of the lateral series being double-rooted and having compressed and serrated crowns, distantly recalling those of the leopard-seal. Between *Zeuglodon* and the shark-toothed dolphins (*Squalodon*) the gap is very great, but still one which might readily be bridged were the missing links forthcoming; and as it is the molars of the one type seem derivable from those of the other. In *Squalodon* the molars alone retain the double-rooted character of *Zeuglodon*, and a transition from the former, in respect of tooth characters, to the modern dolphins and porpoises is afforded by *Saurodelphis*, of the Argentine Pliocene, in which the roots of the teeth, although single, are elongated antero-posteriorly and thus display clear evidence of their original duality. By Dr. Abel, *Saurodelphis* is indeed regarded as occupying the middle position between *Squalodon* and the modern dolphins; but the porpoises are considered to form a side branch which diverged from the main stem at an earlier date than the appearance of the genus first named.

In conclusion, it may be mentioned that modern investigations tend to connect the ancestral toothed whales with the Carnivora, and in no wise support Sir William Flower's favourite idea that these cetaceans trace their descent from early Ungulates.

R. L.

NO. 1670, VOL. 64]

TIBET AND CHINESE TURKESTAN.¹

THE geographical area illustrated by Captain Deasy's book lies in one of the most remote and, at the same time, one of the most interesting regions (regarded politically) in the whole continent of Asia.

British India (represented by Kashmir) lies south and west of it; to the north, north-east and east stretch the shadowy outlines of the "new dominion" of China and the lofty uplands of Tibet; Russia looms large to the north-west; and a long thin slice of Afghanistan reaching out an arm eastwards nearly touches it on the western border. It is an area which bristles with the physical difficulties presented by a vast array of gigantic mountain chains interspersed with flat spaces of desolate upland and salt marsh, and it is an area which those high authorities who regulate international boundaries will sooner or later find it necessary to discuss in close detail; for hereabouts exists one of the nebulous corners of the Empire. Boundary commissions have come and gone, but they have still left undecided the question how far China extends south, or Kashmir north; nor can anyone give final shape to Russia's line of boundary where she leaves Afghanistan and spreads eastward towards China. Consequently Captain Deasy's geographical work, and the interesting book in which it is described, possess a value which can only be regarded as unique. It is only by the light of his excellent map that any conclusions can be drawn as to the physical nature of this rugged no man's land, and only by the light of his description of it can any value be assigned to its apparently desolate hills and valleys. It is no small achievement for a cavalry officer to carry the principles of scouting on scientific geographical lines into such a field of difficulty and desolation as is presented by the buttressed spurs of the Kuen Lun and the Muztagh ranges.

Captain Deasy has set a most excellent example to aspiring travellers in remote regions—an example which has been lately emphasised strongly by the methods of the great traveller Sven Hedin—in the careful preparations which he made for the scientific prosecution of his work. He is not merely an observer. He has proved himself to be an advanced geographical surveyor. He first armed himself with all available data on which to base his exploration, and then attached himself to the best of all possible schools of instruction in order to learn how to make the best use of it. The result is a map which is probably quite accurate enough to take its place as the standard geographical reference for all that part of High Asia with which it deals, and which must be regarded as the most important result of his combined literary and field efforts. His observations were all worked out by the professional computers of the Indian Survey, and the results are tabulated and a record made of their value, in the appendix to his book; so that the indefinite haze which usually envelops similar records by less careful workmen is absent in Captain Deasy's work, and we know precisely what to make of it. The book, which embraces the narrative of his travels (illustrated by an excellent series of photographs), is written with the traditional modesty of a soldier, and gives a faithful and graphic account of the extraordinary difficulties which beset the travellers in the Tibetan borderland. There is no occasion to exaggerate these difficulties, or to draw on the imagination for thrilling episodes and situations. They are formidable enough to tax all the resources of ability and determination which the best of explorers may have at his command. If Captain Deasy's own description of them hardly does justice to the extraordinary obstructiveness of the ugly passes of the gigantic Tibetan ranges, his illustrations at least do not fail to make it plain. It is almost

¹ "Tibet and Chinese Turkestan." By Captain Deasy. Pp. xvi + 420. (London: T. Fisher Unwin, 1901.) Price 21s.

inconceivable to anyone who has not witnessed the experiment, that such passes should be negotiable at all, even if the gymnastic capacity possessed by the yak or by the coarse-bred and clumsy Yarkandi pony be duly appreciated.

Captain Deasy's narrative is a plain and simple record of a very remarkable series of explorations. It cannot fail to be interesting to all who love adventure, or who discern a future of political difficulty looming on the borders of Tibet. It is interesting to the geographer for many reasons, not only because it illustrates certain methods which should be adopted by every modern scientific traveller in Asia, but because it solves many an old geographical problem and suggests one or two new ones. Amongst other important determinations, that of the altitude of the Muztagh-Ata of Sven Hedin

strength by which the Government could hope to surmount the difficulties would be the conviction of public opinion of the importance of education itself and the necessity for its extension and organisation." He anticipated the criticism that must be passed upon such a statement by saying "He would probably be told he was whistling for a wind; that he was asking for an expression of public opinion which would guide the Government in forming either large or small proposals on the subject of education. He did not altogether resent the imputation." It is clear from this that our Ministers acknowledge that they are not leaders so far as education is concerned. The Lord President's reference to whistling for a wind is unhappy when other nations are going full speed ahead under steam. Dr. Macnamara puts the case very forcibly in a letter to Tuesday's *Times*, where he

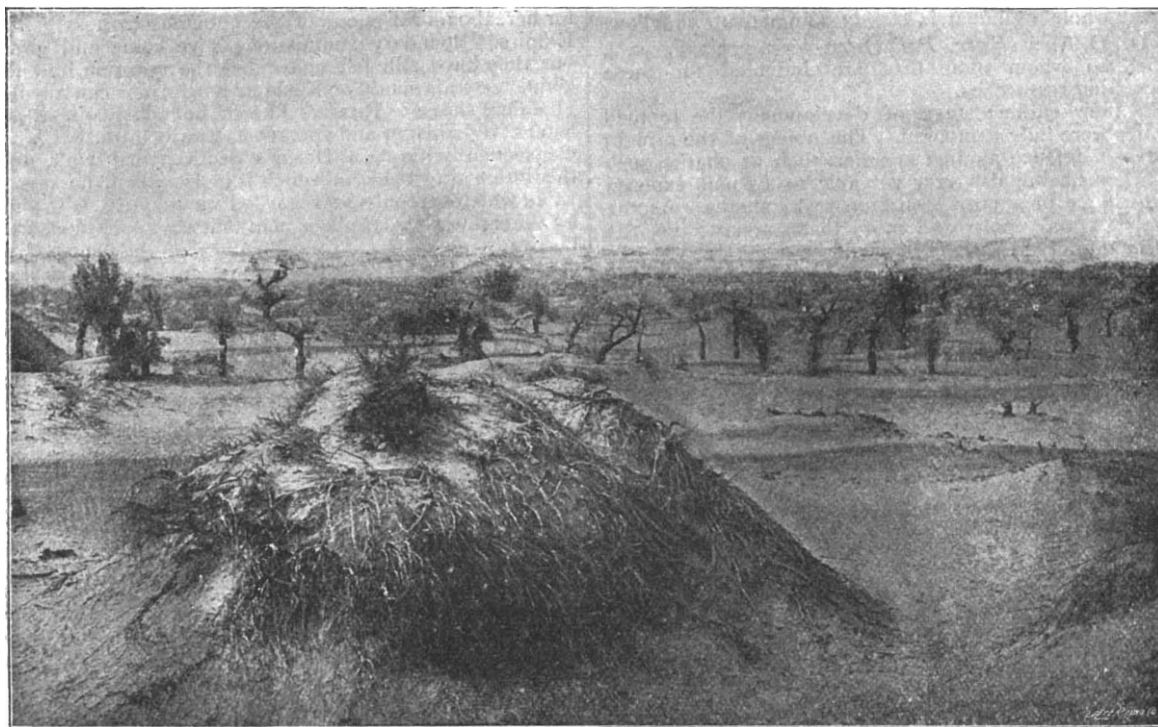


FIG. 1.—Scene in the Takla Makan.

(which is now definitely ascertained to be 24,000 feet above sea-level) fixes the height of the highest peak north of the Himalaya.

T. H. H.

NOTES.

THE president of the Board of Education has appointed Prof. Hugh L. Callendar, F.R.S., to the professorship of physics in the Royal College of Science, South Kensington, in succession to Prof. Rücker, who, as already announced, has become principal of the University of London.

THE Duke of Devonshire has suggested a reason for the tentative way in which the problem of our educational organisation has been attacked. In opening the new Central Technical School at Liverpool on Saturday he placed the responsibility for the present state of affairs upon educational authorities, religious and political bodies, employers, workmen, parents and other representatives of the community, because "the only source of

remarks that what the British people ought to give the Government is, not a breeze, but a tornado. Something should be done to bring about this storm and so waken our rulers into activity. The education question is too important to be permitted to drift along as it has done; and even now it will be a hard task to make up the leeway. Our educational deficiencies are obvious to everyone who has given consideration to the subject. Report after report has been published showing that we only occupy a fifth-rate position when considered from the point of view of provision made to equip people for the industrial struggles of the future. The Government knows this, but it can scarcely appreciate the fact that national progress depends upon intellectual equipment, or it would hasten to do something to organise and extend our educational system.

THE following is the text of the address of congratulation presented to Prof. Virchow, on the occasion of his eightieth birthday, by those members of the Anthropological Section of the British Association who were present at the recent Glasgow